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Near-Infrared $In_{0.53}Ga_{0.47}As$ / $AlAs_{0.56}Sb_{0.44}$ Quantum Cascade Detectors[1] FABRIZIO GIORGETTA, ESTHER BAUMANN, University of Neuchatel, CHRISTIAN MANZ, QUANKUI YANG, KLAUS KOEHLER, Fraunhofer Institute for Applied Solid State Physics, DANIEL HOFSTETTER, University of Neuchatel — Quantum cascade detectors (QCDs) are a promising approach for photovoltaic electro-optical detectors in the infrared. They are based on intersubband transition, which makes them intrinsically fast due to the short unipolar relaxation times. Furthermore, no dark current noise occurs in QCDs because of the biasless operation. So far, QCDs with operating wavelengths down to 5 μm were demonstrated. For shorter wavelengths, a material system with a large conduction band discontinuity ΔE_c is required. A suitable choice is $In_{0.53}Ga_{0.47}As$ / $AlAs_{0.56}Sb_{0.44}$ lattice matched to InP, with ΔE_c=1.6 eV. We therefore present three InGaAs / AlAsSb QCDs detecting down to 2 μm. The exact well and barrier widths were determined by a self-consistent Schroedinger-Poisson solver and the samples were then grown by molecular beam epitaxy. The spectral room temperature responsivity of the three samples peaks at 2.34 μm (R_{max}=23 mA/W), 2.37 μm (16 mA/W), and 2.03 μm (4.3 mA/W).

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